Electrically driven pump for the maintenance of swimming pools

The present invention relates to a dual electric pump intended for the maintenance of swimming pools.

It is known that the maintenance of swimming pools requires the circulation of a plurality of currents of water. The water from the pool thus circulates in a filtration assembly, water is conveyed to a device for cleaning the swimming pool, water is used to draw away the debris, leaves and the like deposited on the surface of the swimming pool, water is removed by means of a plug at the bottom of the swimming pool, etcetera. These different circulations of water are brought about by respective pumps which are each adapted to the required flow rate and pressure.

The large number of pumps, and therefore motors which drive them, renders the equipment of swimming pools complex and the object of the invention is to reduce this complexity.

More precisely, the subject-matter of the invention is a dual pump which has a single electric motor and which is intended to perform the function of two different pumps which are conventionally used for the maintenance of swimming pools.

Although the use of a dual pump of this type may be applied to various currents of the swimming pool, the invention is described in terms of its application to the circulation of the filtration current and the circulation of the supply current for a cleaning device.

More precisely, the invention relates to a dual pump having an electric motor having a shaft, each end of which drives a respective pump.

According to the invention, an electrically driven pump for the maintenance of swimming pools comprises an electric motor having a drive shaft, the shaft having, at each of the axial ends thereof, a shaft output and two pump impellers, each shaft output driving a respective pump impeller, the first of the impellers operating at a low pressure and high flow rate, and the second of the impellers operating at a higher pressure and lower flow rate.

The maintenance assembly for swimming pools is thus simplified since a single electric motor, and therefore a single electrical connection, is required and the programming of the filtration and operation times for the cleaning device is simplified.

It is advantageous for the water pumped by the second pump impeller to be drawn off close to the outlet of the first pump impeller and to return to the inlet of the second impeller. Preferably, the draw-off location is located in a low-pressure pump body, upstream of the low-pressure outlet.

The pump is thus a pump which has two outlet steps operating in parallel and partially in series and which is capable of providing the flow rates and pressures required, for example, for the filtration and the operation of a cleaning device, with excellent efficiency.

According to a very advantageous feature, the water pumped by the second pump impeller between the draw-off location and

the inlet towards the second pump impeller circulates around the motor in order to cool the motor.

In this manner, the electric motor of the pump is cooled under all operating conditions and no special ventilation of the region is required, with the result that the energy loss is minimised.

In a first variant, the circulation of the water pumped by the second pump impeller is carried out in a coiled pipeline which surrounds the motor.

In a second variant, the circulation of the water pumped by the second pump impeller is carried out in a cylindrical space formed around the motor, between the motor and an external housing.

It is advantageous for the assembly formed by the motor, the housing, the two pump impellers and the high-pressure pump body to be connected in a releasable manner to the body of the low-pressure pump. In one embodiment, the releasable connection between said assembly and the low-pressure pump body is carried out by means of bayonet-type locking. It is therefore advantageous for the low-pressure pump body to be incorporated in a concrete block which also contains a water filtration device for swimming pools.

In one example of use, the impeller which operates at a low pressure and high flow rate is intended for the filtration of the pool water, and the other impeller which operates at a higher pressure and lower flow rate is intended for a cleaning device for swimming pools.

Other features and advantages of the invention will be better appreciated from the following description of embodiments, given with reference to the appended drawings, in which:

- Figure 1 is a perspective view of a pump when viewed from the side of the water outlets;
- Figure 2 is another perspective view of the pump when viewed from the side of the high-pressure pump impeller;
- Figure 3 is a partially sectioned side view of the pump of Figures 1 and 2;
- Figure 4 is a perspective view of another embodiment of the dual pump according to the invention;
- Figure 5 is a section of the lower portion of the pump illustrated in Figure 4; and
- Figure 6 is a half-section of the pump of Figure 4, taken along a different plane from the section plane of Figure 5.

In Figures 1 to 3, a pump 1 comprises an electric motor 2 having a shaft, each end of which forms a shaft output 3 which is intended to drive a pump impeller. At a first end, a first impeller 4 provides low-pressure pumping at a high flow rate for the filtration circuit of the swimming pool whilst, at the other opposite end of the motor, the other shaft output drives a second impeller 6 for pumping at medium or high pressure at a low flow rate which is intended for controlling a cleaning device for swimming pools. The water of the swimming pool enters via an axial aperture 11 and leaves the low-pressure pump 4 via an outlet 12, towards the pool of the swimming pool.

According to one feature which is advantageous but not indispensable, the water intended for the pump impeller 6 is drawn off close to the outlet of the low-pressure pump

impeller 4. In Figure 2 in particular, the reference numeral 7 designates a connection for a pipe 8 which supplies, via an inlet 9, the medium- or high-pressure pump whose outlet is designated 10.

In the embodiment illustrated, the pipe 8 surrounds the housing 13 of the motor, with a coil-like arrangement being formed which is arranged in close contact with this housing, for example, by means of welding. The water which circulates in the pipe 8 provides effective cooling for the electric motor which is located in the housing 13. This feature is very advantageous since the electric motor is cooled in an optimum manner without it being necessary to ventilate the region in which the pump is located, in an effective manner and without consuming energy.

In one embodiment, an electric motor rated at 1700W which is supplied with alternating current at 220V drives a first pump impeller 4 which provides a flow rate of $18m^3/h$ at a pressure of 1.3 bar, and a second pump impeller 6 which provides a flow rate of $2m^3/h$ at a pressure of 2.8 bar for the operation of the device. The second pump impeller 6 therefore increases the pressure of the water which is intended for the operation of the device from 1.3 to 2.8 bar.

The examples given for the power of the motor and for the flow rates and pressures of the pump impellers used for the filtration and for the operation of the device are only examples which must be modified in accordance with the technical features of the swimming pool and in particular the dimensions of the pool thereof. When the device is not used, the water from the second pump impeller can be conveyed

directly to the pool of the swimming pool or used for another purpose.

Figures 4 to 6 illustrate another embodiment of the dual pump according to the invention. This pump 14 draws in water via an inlet 15 and conveys the water in the form of a low-pressure current having a high flow rate. An outlet 17 conveys a high- or medium-pressure current having a low flow rate.

The pump is driven by means of an electric motor 18 which comprises a stator 19 and a rotor 20. The stator comprises windings which are supplied with electrical current in conventional manner and which are not illustrated. The rotor 20 is fixedly joined to a shaft having two outputs or ends 21 and 22.

The first low-pressure pump impeller 23 having a high flow rate is mounted on a first shaft output 21. As illustrated in Figure 5, this impeller rotates in a centrifugal pump body which opens via the outlet 16. Upstream of this outlet 16, an opening 24 connects an adjacent location of the outlet of this pump to an annular space 25 which communicates, via openings 26, with a space 27 which is formed between an inner duct 28 which forms a support for the motor 18 which is located at the inner side and a housing 29 which is concentric relative to the duct 28. The space 27 is therefore a cylindrical space formed completely around the motor.

This space, which is supplied by the openings 26 located at the lower portion of the pump as illustrated in Figure 6, joins, at the upper portion of this Figure, a second pump impeller 30 which is intended to increase the pressure of the

water which is conveyed in this manner. The water at high or medium pressure having a low flow rate is thus discharged via the outlet 17. This pump impeller 30 is mounted on the other end 22 of the shaft of the electric motor 18.

It can further been seen in Figure 6 that the motor 18 is separated from the two pump impellers in a fluid-tight manner by means of lip-type seals 31. The electric motor 18 is thus surrounded in a fluid-tight manner at the inner side of the space of the duct 28. The stator 19 is force-fitted in the duct 28, with the result that the exchange of heat between the stator 19 and the water which circulates in the cylindrical space 27 via the metal duct 28 is excellent.

Figures 4, 5 and 6 illustrate another advantageous feature of the pump according to the invention which is used for the maintenance of swimming pools. According to this feature, the assembly illustrated in Figure 6, that is to say, the motor, the housing, the two pump impellers and the body of the high-pressure pump as a whole, forms an assembly which can be separate from the body of the low-pressure pump. As indicated in Figure 5, the assembly illustrated in Figure 6 and the body of the low-pressure pump co-operate by means of two fluid-tight seals 35 which are arranged substantially in the same plane and which are concentric relative to each other.

The strength of the assembly illustrated in Figure 6, which is fixedly joined by means of bolts 32, is provided by means of tongues 33 which are fixedly joined to the releasable assembly illustrated in Figure 6 and which are inserted below fingers 34 which extend beyond the body of the low-pressure pump. These assemblies comprising tongues and fingers are distributed in a uniform manner around the pump so that the

assembly illustrated in Figure 6 can be fixed to the body of the low-pressure pump by means of rotation about the axis thereof, the tongues 33 and the fingers 34 forming a bayonet-type locking assembly.

In this case, the body of the low-pressure pump can be connected in a robust manner to the filtration assembly for the swimming pool and to other elements, the whole being cast in concrete. The parts which may require maintenance, that is to say, the assembly illustrated in Figure 6, can be readily separated from the low-pressure pump body which is then integrated in the concrete block which contains the filtration system for the swimming pool.

In this manner, since a dual pump replaces two pumps which are conventionally used, the invention allows the cost of installation to be considerably reduced. Since the motor is cooled in an excellent manner, it can, on the one hand, function with a high level of efficiency under all conditions of use, and, on the other hand, the temperature of the rotating parts, bearings, joints and other wear parts remains low, with the result that the service life of the pump is extended considerably. Since a single dual pump is used instead of two pumps, the space required for the assembly is reduced. Furthermore, since there is only one motor provided, the operating noises are reduced, especially since no ventilation is required for cooling the motor. Furthermore, since the motor drives a pump at each end, it can be readily balanced.

Although the invention has been described with reference to a pump which is used to circulate water in the filtration circuit and for the operation of the cleaning device, other

applications are possible. For example, when the operation of the cleaning device is not required, it is possible to use the high- or medium-pressure flow rate for any other type of device for cleaning pools, for massage, for increasing the flow rate, for example, for the filtration circuit, etcetera.

Of course, various modifications can be carried out by the person skilled in the art to the pumps, which have been described above only by way of non-limiting example, without departing from the scope of the invention.